

REMARKS

(I) Real Party in Interest

The real party in interest in the subject patent application is the assignee, Danfoss A/S, as evidenced by the assignment recorded with the U.S. Patent and Trademark Office on March 29, 2006 (Reel 017756/Frame 0916).

(II) Status of Amendments

No amendments have been submitted after the Final Office Action issued September 8, 2008.

(III) Grounds of Rejection to be Reviewed

Applicants respectfully request review of the following grounds of rejection:

the rejections of claims 1-5 and 8-10 under 35 USC § 102(b) as anticipated by Tan (U.S. Patent No. 5,687,759); and

the rejections of claims 6 and 7 under 35 USC § 103(a) as obvious over Tan in view of Kubiak (U.S. Patent No. 4,025,045).

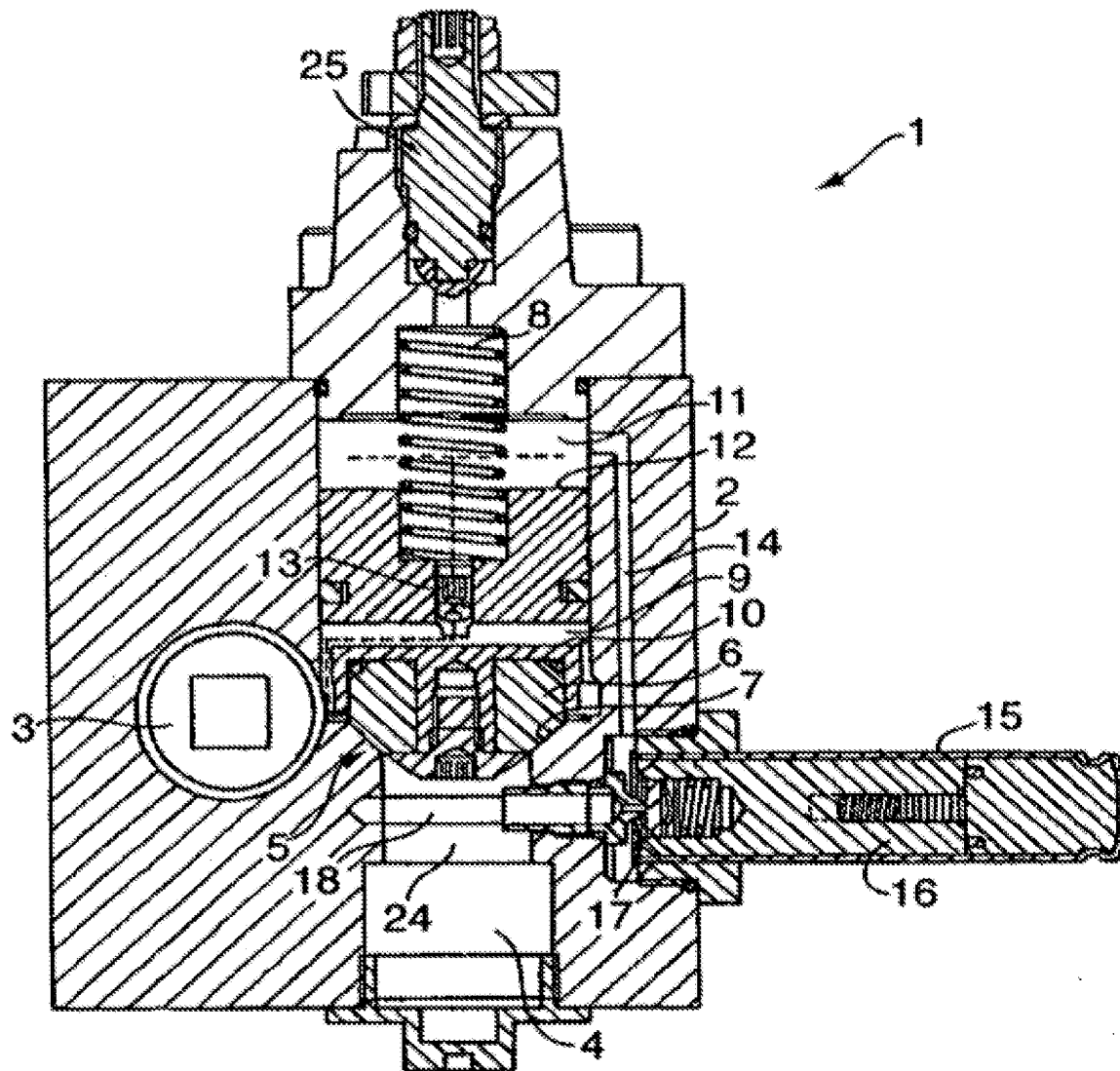
(IV) Facts

Claims 1-10 are pending for consideration.

Claims 1-10 presently stand rejected.

Applicants request reconsideration of the rejections of claims 1-10.

Referring to Applicants' Figure 1, the present invention relates to a suction nozzle arrangement 18 that is provided in a pilot-controlled valve arrangement 1. The suction nozzle arrangement is disposed *in a flow path* between an inlet connection 3 and an outlet connection 4. A closing device 5 is located in the same flow path as the suction nozzle arrangement. The closing device 5 includes a valve element 6 and a valve seat 7.



Applicants' Figure 1

The suction nozzle arrangement 18 is disposed at one end of a channel arrangement 14 formed in the pilot-controlled valve arrangement. A pressure chamber 11 is disposed at the other end of the channel arrangement 14. A pilot valve 15 is disposed in the channel arrangement 14. When the pilot valve 15 is first opened, fluid flows from the pressure chamber 11 to the outlet connection 4 through the channel arrangement 14 and the suction nozzle arrangement 18.

Removing fluid from the pressure chamber 11 lifts the valve element 6 from the valve seat 7, opening the closing device 5.

While the closing device 5 is opened, fluid flows from the inlet connection 3 to the outlet connection 4 through the flow path where the suction nozzle arrangement 18 is disposed. The fluid flowing through the flow path interacts with the suction nozzle arrangement 18 *to suck fluid from the pressure chamber 11* through the channel arrangement 14. (page 2, line 25 to page 3, line 17 and page 7, lines 32-33). By sucking fluid from the pressure chamber 11, the suction nozzle arrangement 18 advantageously ensures that the pressure in the pressure chamber remains at a relatively low value while the closing device is opened. Thus, the suction nozzle arrangement prevents the heavily varying performances during opening (valve chatter) known in prior art pilot valves. (page 3, lines 8-18 and page 2, lines 15-18).

Accordingly, **independent claim 1** recites a valve arrangement 1 with a housing 2 (page 6, line 4), an inlet connection 3 and an outlet connection 4 (page 6, lines 4-5), which are connected with each other via a flow path (page 6, line 8), in which is located a closing device 5, which has a valve seat 7 and a valve element 6 interacting with the valve seat (page 6, lines 8-10), the valve element being loaded in the direction of the valve seat by a resetting device 8 (page 6, lines 12-16) and being acted upon on the side facing the valve seat by a pressure in a first pressure chamber 9 (page 6, lines 18-21), said pressure corresponding to the pressure in the inlet connection 3, when the closing device is closed, and on the side 12 facing away from the valve seat by the pressure in a second pressure chamber 11 (page 6, lines 23-26), which is connected with the outlet connection via a channel arrangement 14 (page 7, lines 1-3), in which is located at least one

auxiliary valve 15 (page 7, lines 3-9), and with the first pressure chamber via a throttle 13 (page 6, lines 28-31), wherein the channel arrangement ends in a suction nozzle arrangement 18 (page 7, line 32 to page 9, line 2), which is located in the flow path (page 7, lines 32-33).

(V) Argument

The present rejections of Applicants' claimed valve arrangement entirely fail to recognize fundamental principles of fluid dynamics. For at least this reason, Examiner again has overlooked the stark differences between the plain language of Applicants' claims and the teachings of the cited references. Since proper rejections must be founded in the relevant law and facts (including applicable scientific principles, such as Bernoulli's principle), Applicants respectfully request that the present rejections be withdrawn as improper under 35 USC §§ 102 and/or 103.

Claims 1-5 and 8-10 are not anticipated by Tan (U.S. Patent No. 5,687,759).

An anticipation rejection is improper unless a single prior art reference *identically* shows or discloses *each and every claim recitation*. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q. 1566, 1567 (Fed. Cir. 1990). Moreover, "THE WORDS OF A CLAIM MUST BE GIVEN THEIR "PLAIN MEANING" UNLESS SUCH MEANING IS INCONSISTENT WITH THE SPECIFICATION." MPEP 2111.01(I), citing to *Chef America, Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1372, 69 USPQ2d 1857 (Fed. Cir. 2004), and to *In re Zietz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

Tan does not identically show or disclose the "suction nozzle arrangement" recited by claim 1. At most, Tan discloses a pilot valve 20 that has a restricted orifice 40 formed in a plug 38. As in other prior art pilot valves, the

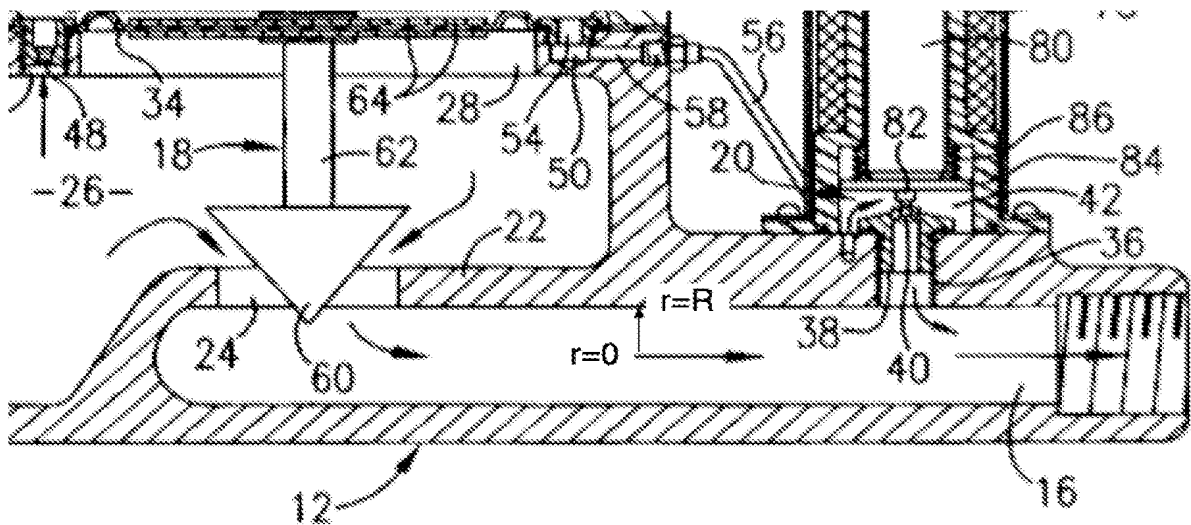
plug 38 is housed in a threaded opening 36 that “merely ends in the wall of” Tan’s outlet 16. (See Tan, Figures 1 and 2 and column 3, line 66 to column 4, line 6; see present Specification, paragraph [0008] (discussing deficiency of prior art valves)). Thus, Tan’s orifice 40 is not a suction nozzle. Rather, the orifice 40 is structurally and functionally different from the “suction nozzle arrangement” recited by claim 1.

Applicants’ claimed suction nozzle arrangement is an auxiliary valve channel arrangement having an opening that is moved “*into* the flow path, so that the fluid flowing in the flow path can practically suck off the fluid located in the channel arrangement[.]” (Specification, paragraph [0008], emphasis added). Moving the opening of the channel arrangement *into* the flow path between the inlet connection and the outlet connection is what causes the *suction* of Applicants’ suction nozzle arrangement. The suction occurs because flow velocity *in* a flow path is higher than flow velocity at the wall of the flow path. Indeed, fluid viscosity requires that flow velocity at the wall of the flow path is essentially zero. Thus, Bernoulli’s principle causes static pressure to be lower in the middle of the flow path than at the boundary of the flow path. (See Specification, paragraph [0015]; see, also, the equation and figures below).

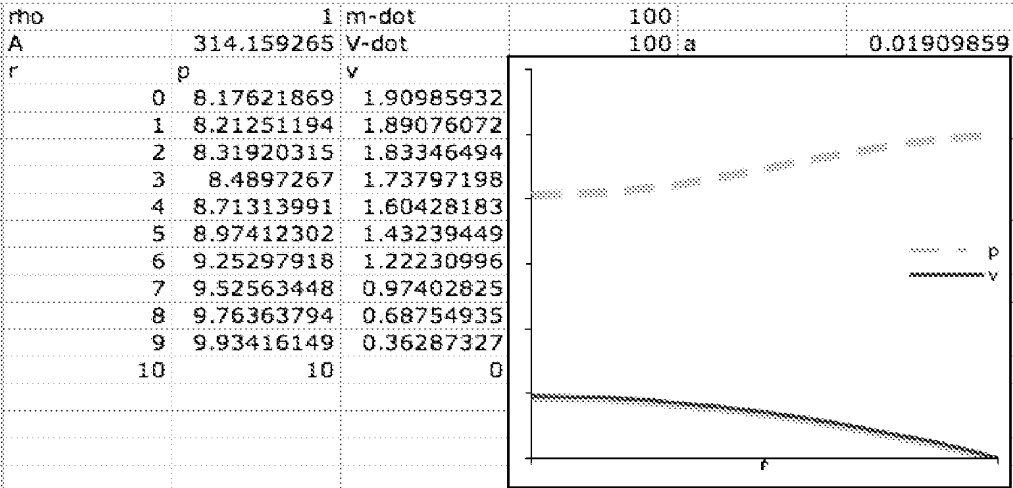
By contrast, Tan’s orifice 40 is not *in* the flow path of Tan’s outlet 16. Thus, Bernoulli’s principle causes static pressure at Tan’s opening 36, on the wall of Tan’s outlet 16, to be approximately equal to the static pressure in Tan’s control chamber 32. As should now be apparent, without moving the opening of Tan’s orifice 40 *into* Tan’s outlet 16, no suction could be created at Tan’s orifice 40. Tan’s orifice 40 is not *in* Tan’s outlet 16. Thus, Tan’s orifice 40 is not functionally or structurally equivalent to a suction nozzle arrangement.

$$\left(\frac{\rho v^2}{2} + gh + p\right)_{r=0} = \left(\frac{\rho v^2}{2} + gh + p\right)_r \Rightarrow \Delta_{r=0}^{r=R} p = -\frac{\rho}{2} \Delta_{r=0}^{r=R} v^2$$

**Bernoulli's equation for fully-developed incompressible flow
in a horizontal circular cross-section**



Tan, Figure 2
(radial dimension added in horizontal circular cross-section of Tan's outlet 16)



p and v as functions of r, according to above diagram and equation

See, further, Incropera and DeWitt, *Introduction to Heat Transfer, 3d ed.*, John Wiley & Sons, pages 388-391 (1996).

For at least these reasons, Tan fails to show or disclose the suction nozzle arrangement recited by claim 1. Thus, the rejection of claim 1 over Tan is

improper under 35 USC § 102. At least because claims 2-10 depend from claim 1, the rejections of dependent claims 2-5 and 8-10 over Tan also are improper under 35 USC § 102(b).

Claims 2 and 3 are not anticipated by Tan.

Claim 2 depends from claim 1, and further recites that the suction nozzle arrangement has at least one suction nozzle, which is directed towards an outlet connection and has a bordering wall, whose outside is exposed to fluid flowing in the flow path. Claim 3 depends from claim 2, and includes additional recitations. For several additional reasons, the rejections of claims 2 and 3 over Tan are improper under 35 USC § 102.

First, even if Tan's orifice 40 was wrongly considered to be a suction nozzle, Tan's orifice 40 *is not* directed toward an outlet connection, as recited by claim 2. As shown in the Figures of the present application, being directed toward an outlet connection means being pointed along the general direction of flow through an outlet connection. By contrast, Tan's orifice 40 is directed perpendicular to the general direction of flow through Tan's outlet 16.

Second, Tan's orifice 40 entirely lacks a bordering wall whose *outside* is exposed to fluid flowing *in* a flow path connecting an inlet connection and an outlet connection, as recited by claim 2.

For at least these additional reasons, the rejection of claim 2 is improper under 35 USC § 102(b). Since claim 3 depends from claim 2, the rejection of claim 3 also is improper for all the reasons stated above.

Claims 6 and 7 are not obvious over Tan and Kubiak (U.S. Patent No. 4,025,045).

Claim 6 depends from claim 1, and further recites that the suction nozzle arrangement of claim 1 has a pipe, which has a slot in the direction of the outlet

connection. Claim 7 depends from claim 6, and further recites that the pipe is connected with the channel on a frontside.

Contrary to the guidance of MPEP §§ 2111 and 2111.01 (citing to *Zietz* and *Chef-America*, above), and contrary to common sense, Examiner maintains the previous rejections of claims 6 and 7 because “[a]ny conduit can be considered broadly as a pipe and Kubiak teaches a nozzle[.]” (Final Office Action, page 2). Applicants respectfully disagree for several reasons.

First, Tan fails to teach or suggest a suction nozzle arrangement for the reasons stated with reference to claim 1. Only the application of impermissible hindsight, using Applicants’ claims as a template, would lead one of ordinary skill to modify Tan so as to provide a suction nozzle arrangement.

Second, it is *not* “reasonable to modify the orifice of Tan with the teachings of Kubiak” (Final Office Action, page 2) “in order to decrease the possibility of fluid being through the nozzle in the reverse direction” (Final Office Action, page 4). Rather, the proposed modification would render Tan’s orifice 40 unsuitable for its intended purpose of restricting flow, since Tan’s control plug 82 could not reasonably be expected to reliably seal a non-round orifice. Additionally, Examiner utterly fails to explain how making Tan’s orifice 40 oval, rather than circular, might prevent reversal of flow through Tan’s orifice. Since one of ordinary skill in the art would not be motivated to attempt the modification proposed by Examiner, the combination of Kubiak’s orifice 21 with Tan’s orifice 40 is improper.

Third, Kubiak entirely fails to teach or suggest a *suction* nozzle arrangement. The “suction nozzle arrangement” recited by claim 1 extends *into* a flow path in order to provide suction. Kubiak’s oval orifice 21 does not *extend*

into a flow path. Examiner has not shown how Kubiak's oval orifice might provide suction without extending into a flow path. Thus, Kubiak fails to supply the deficiencies of Tan with reference to claim 1.

Fourth, neither Kubiak's oval orifice 21, nor Tan's orifice 40, includes a slot *in the direction of* an outlet connection. As best shown in Figures 1 and 3b of the present application, "in the direction of the outlet connection" means substantially in the direction of fluid flow through the flow path from an inlet connection to an outlet connection.

Thus, even if made, the improper combination of Kubiak and Tan *still* fails to teach or suggest a suction nozzle arrangement having a pipe that has a slot in the direction of an outlet connection, as recited by claim 6. For at least the stated reasons, the rejection of claim 6 is improper under 35 USC § 103. At least because claim 7 depends from claim 6, the rejection of claim 7 also is improper under 35 USC § 103.

Conclusion

Having shown the errors and deficiencies of the present rejections, the Applicants respectfully submit that no sufficient reason has been shown why the present claims might not be patentable over the known prior art. Accordingly, the Applicants respectfully request that pending claims 1-10 be promptly passed to issue.

Applicants believe that no fees presently are due in the above-identified application. However, the Commissioner is authorized to charge any additional fees that may be required to Deposit Account No. 13-0235.

Respectfully submitted,

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